

AUG - 5 1993

June 1993



# ***Biology 30***

## ***Grade 12 Diploma Examination***



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June 1993

# **Biology 30**

## **Grade 12 Diploma Examination**

### **Description**

Time allotted: 2.5 h

Total possible marks: 100

This is a **closed-book** examination consisting of **two** parts:

#### **Part A**

has 70 multiple-choice questions each with a value of one mark.

#### **Part B**

has 4 written-response questions for a total of 30 marks.

### **Instructions**

- Fill in the information required on the answer sheet and the examination booklet as directed by the presiding examiner.
- Carefully read the instructions for each part before proceeding.
- The presiding examiner will collect your answer sheet and examination booklet and send them to Alberta Education.
- Do not fold the answer sheet.

**Note:** The perforated pages at the back of this booklet may be torn out and used for your rough work. **No marks** will be given for work done on the tear-out pages.

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# Part A: Multiple Choice

## 70 Questions

### Instructions

- Read each question carefully and decide which of the choices **best** completes the statement or answers the question.
- Locate that question number on the separate answer sheet provided and fill in the circle that corresponds to your choice.

### Example

This diploma examination is for the subject of

- A. biology
- B. physics
- C. chemistry
- D. mathematics

Answer Sheet

☒ (B) (C) (D)

- Use an **HB pencil only**.
- If you wish to change an answer, erase **all** traces of your first answer.

**Note:** The perforated pages at the back of this booklet may be torn out and used for your rough work. **No marks** will be given for work done on the tear-out pages.

**Do not turn the page to start the examination until told to do so by the presiding examiner.**



# Part A: Multiple Choice

70 Questions

Instructions

- Read each question carefully and decide which of the choices best answers the question or answers the question.
- Locate the question number on the question paper and mark the answer on the answer line.

Example

The opposite of 5 is 15.  
Select the correct answer.

- A. 10
- B. 15
- C. 20
- D. 25

Answer: D

1 2 3 4 5

- Use an HB pencil only.
- If you wish to change an answer, erase the answer completely.

Notes: The preferred paper of the back of this booklet may be used and used for your rough work. No marks will be given for work done on the bottom paper.

The test time is 1 hour 15 minutes. The examination will start at 10:00 AM. The following examination

1. When a lysosome combines with a vacuole that contains complex organic molecules, which function is initiated?
  - A. Cell division
  - B. Protein synthesis
  - C. Cellular digestion
  - D. Cellular respiration
  
2. Which substance is **not** transported across cellular membranes by active transport?
  - A. Potassium ions
  - B. Sodium ions
  - C. Glucose
  - D. Water

*Use the following information to answer question 3.*

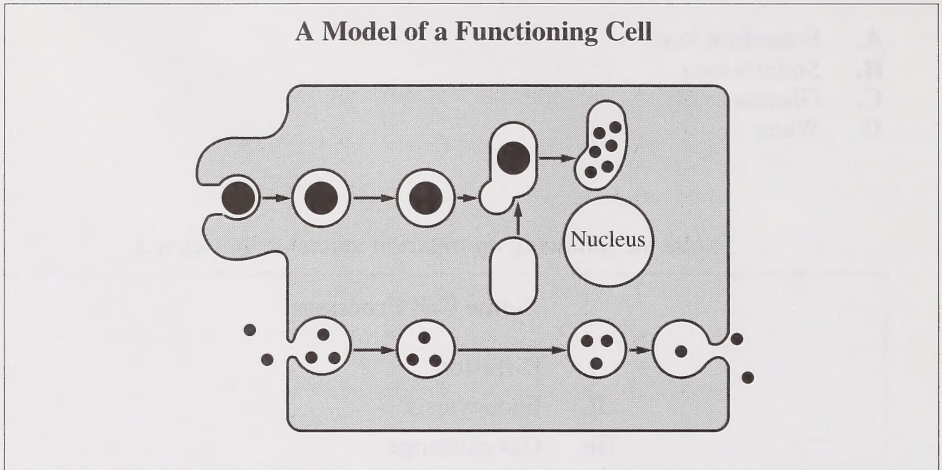
**Some Cell Processes**

- I. Diffusion
- II. Endocytosis
- III. Gas exchange
- IV. Synthesis of macromolecules
- V. Active transport
- VI. Osmosis

3. Which cell processes consume energy released from ATP?
  - A. I, III, and VI
  - B. I, IV, and V
  - C. II, III, and VI
  - D. II, IV, and V

4. Lipid-soluble substances tend to move across cell membranes more easily than those substances that are not lipid soluble. The reason is that
- A. lipids are small molecules
  - B. nonlipid substances are large in size
  - C. lipids make up the basic structure of cell membranes
  - D. ATP is expended only in the movement of lipid-soluble substances

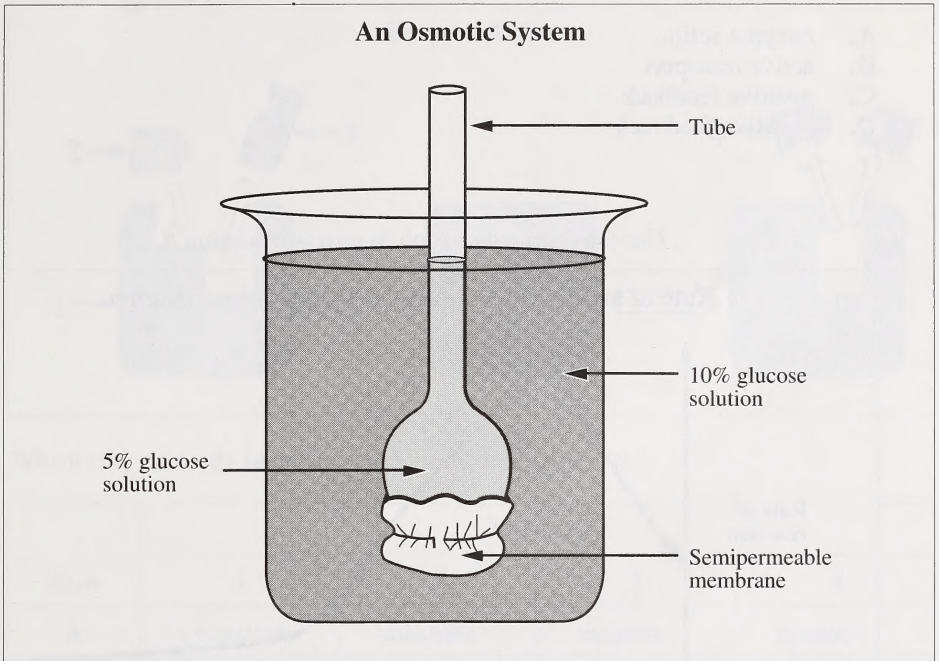
*Use the following diagram to answer question 5.*



5. Which statement is **not** supported by this diagram?
- A. Organelles, after being formed, retain a fixed shape.
  - B. Organelles, during cellular processes, undergo changes in surface area.
  - C. The membranes of organelles are similar in composition to the cell membrane.
  - D. The membranes of organelles can fuse with each other as well as with the cell membrane.



Use the following diagram to answer question 6.

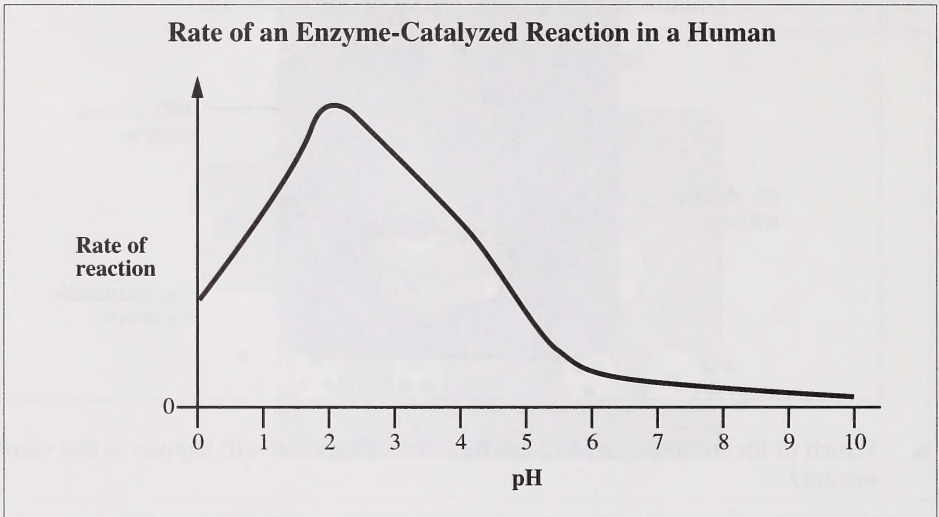


6. Which of the following statements **best** describes what will happen in this osmotic system?
- A. The solution level in the tube will rise because water will move across the semipermeable membrane from the 10% glucose solution to the 5% glucose solution.
  - B. The solution level in the tube will drop because water will move across the semipermeable membrane from the 5% glucose solution to the 10% glucose solution.
  - C. The solution level in the tube will remain the same because every water molecule moving out of the tube across the semipermeable membrane will be replaced by a glucose molecule moving into the tube.
  - D. The solution level in the tube will rise as water moves across the semipermeable membrane from the 10% glucose solution to the 5% glucose solution, and then the level will drop as the concentration of glucose molecules begins to even out.

7. A cyclic mechanism that functions in homeostasis is

- A. enzyme action
- B. active transport
- C. positive feedback
- D. negative feedback

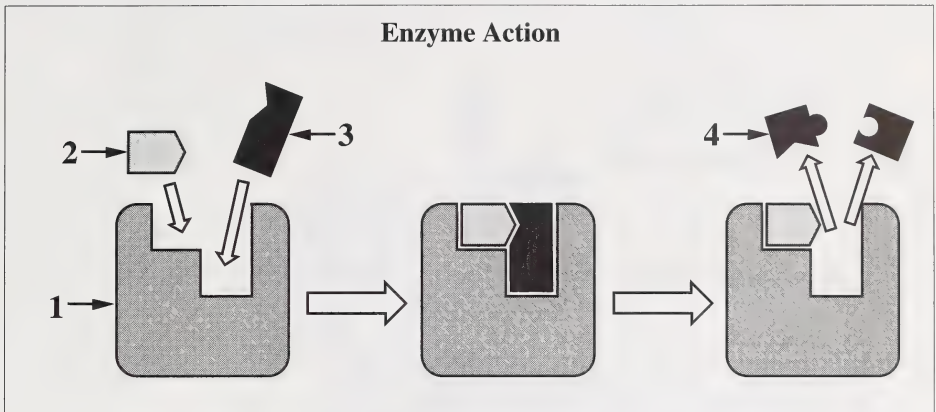
*Use the following graph to answer question 8.*



8. From this graph, it could be correctly inferred that the enzyme is

- A. salivary amylase
- B. a gastric enzyme
- C. a typical intracellular enzyme
- D. most efficient in an alkaline medium

Use the following diagram to answer question 9.



9. Which row correctly identifies **each** numbered molecule?

Row	Molecule			
	1	2	3	4
A	coenzyme	substrate	enzyme	product
B	product	inhibitor	enzyme	substrate
C	enzyme	inhibitor	substrate	product
D	enzyme	coenzyme	substrate	product

10. During the process of digestion, macromolecules of food are converted into

- A. glucose, water, minerals, and vitamins
- B. amino acids, glucose, vitamins, and water
- C. inorganic micromolecules, minerals, and vitamins
- D. monosaccharides, amino acids, fatty acids, and glycerol

11. Glucose molecules may bond together to form

- A. glycerol
- B. glycogen
- C. fatty acids
- D. amino acids



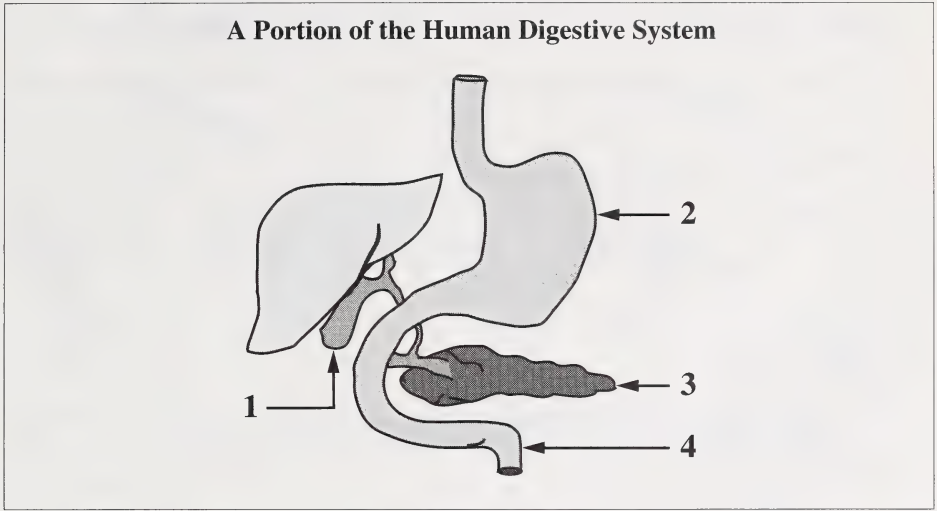
12. An increase in a person's saliva secretion in response to the smell of food illustrates that the salivary glands are under
- A. nervous control
  - B. hormonal control
  - C. voluntary control
  - D. mechanical control
13. In humans, the length of the large intestine is an adaptation related to
- A. digestion of vitamins
  - B. conservation of water
  - C. deamination of excess amino acids
  - D. digestion of carbohydrates, lipids, and proteins

*Use the following information to answer question 14.*

Results of Analyses of Food Mixtures				
Food Mixture	Biuret Test	Iodine Test	Benedict's Test	Sudan IV Test
I	violet	yellow-brown	blue	dissolved
II	light blue	black	orange	undissolved
III	violet	yellow-brown	blue	undissolved
IV	light blue	black	orange	dissolved

14. Which food mixture contains proteins and lipids but lacks reducing sugars?
- A. I
  - B. II
  - C. III
  - D. IV

Use the following diagram to answer questions 15 and 16.



15. Which row correctly describes **each** of the numbered structures?

Row	Structure			
	1	2	3	4
A	stores bile	contents very basic	secretes $\text{HCO}_3^-$	part of small intestine
B	stores lipase	contents very acidic	secretes HCl	digests many types of foods
C	stores bile	contents very acidic	secretes insulin	contents are slightly basic
D	stores lipase	contents very basic	secretes glucagon	lining has many villi

16. Blockage of the duct that leads from structure 1 would reduce the rate of digestion of

- A. lipids only
- B. lipids and proteins only
- C. carbohydrates and proteins only
- D. carbohydrates, proteins, and lipids

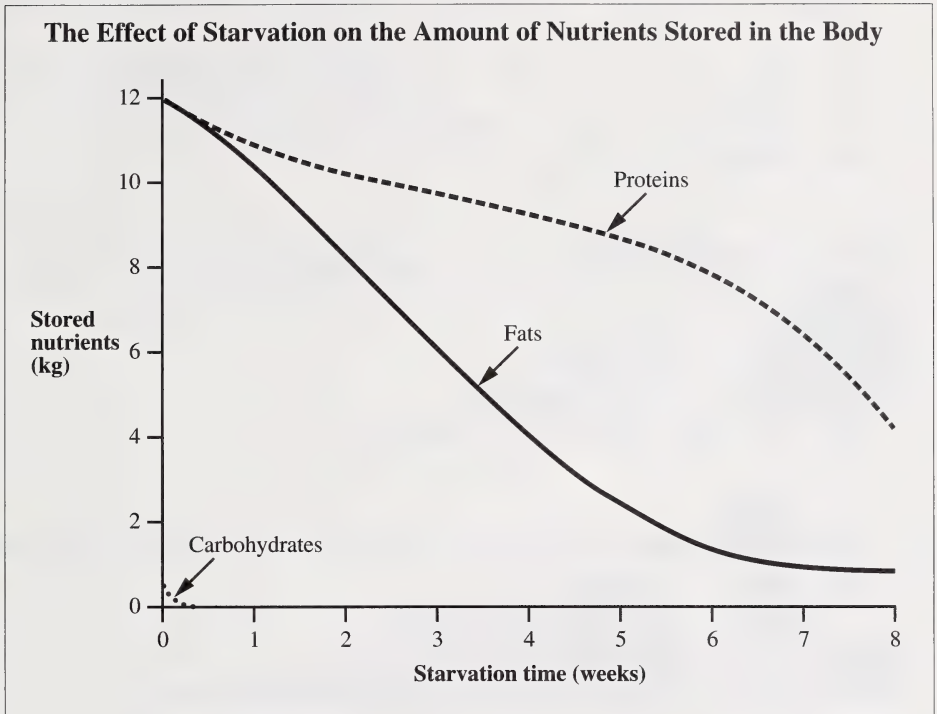
Use the following information to answer question 17.

An Investigation of Egg White Digestion				
Purpose: To investigate the effect of pH on the function of two different protein-digesting enzymes.				
Test Tube	1	2	3	4
Contents	egg white pepsinogen H <sub>2</sub> O HCl	egg white pepsinogen H <sub>2</sub> O NaOH	egg white pancreatin H <sub>2</sub> O HCl	egg white pancreatin H <sub>2</sub> O NaOH
pH	2	8	2	8
A student prepared four test tubes, each with the contents listed. The pH of each tube was adjusted to the level shown. The tubes were incubated at 37°C for one hour.				

17. Appropriate tests showed that the greatest amount of digestion occurred in test tubes 1 and 4. The student should conclude, therefore, that in order to function,
- A. both pepsinogen and pancreatin require an acidic environment
  - B. both pepsinogen and pancreatin require an alkaline environment
  - C. pepsinogen requires an acidic environment and pancreatin requires an alkaline environment
  - D. pepsinogen requires an alkaline environment and pancreatin requires an acidic environment
- 
18. A person has symptoms that include nausea, blood in the feces, and abdominal pain three or four hours after eating. It would be **most** reasonable to suspect that this person is suffering from
- A. inflammation of the appendix
  - B. pancreatic malfunction
  - C. peptic ulcers
  - D. gallstones



Use the following graph to answer question 19.



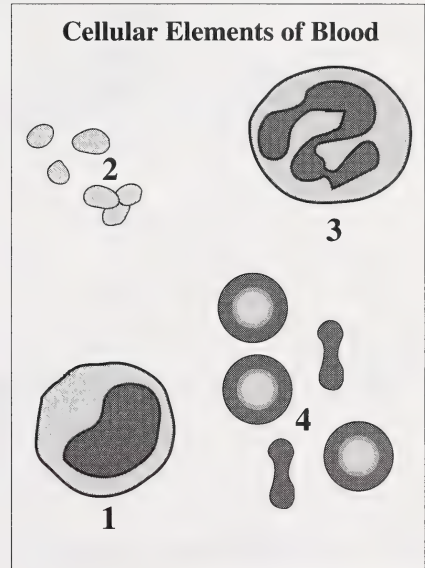
19. According to this graph, in which sequence are stored nutrients depleted by the body during starvation?
- A. Proteins, fats, and carbohydrates
  - B. Carbohydrates, proteins, and fats
  - C. Fats, proteins, and carbohydrates
  - D. Carbohydrates, fats, and proteins
- 
20. The duodenum is capable of secreting several substances including the hormone cholecystikinin (CCK). Among other things, CCK stimulates the gallbladder to contract, which forces bile into the duodenum. Given this information, it would be logical to predict that
- A. CCK is capable of digesting lipids
  - B. bile is needed to prevent the accumulation of CCK
  - C. removing the gallbladder will inhibit the manufacture of CCK
  - D. the stimulus for CCK release is the arrival of lipids in the duodenum

- 21.** Blood vessels that contain valves and rely on skeletal muscles to move blood are called
- A.** veins
  - B.** arteries
  - C.** arterioles
  - D.** capillaries
- 22.** A high concentration of carbon dioxide in the blood
- A.** increases heart rate
  - B.** decreases breathing rate
  - C.** inhibits ventricular contraction
  - D.** slows oxygen uptake by lung capillaries
- 23.** The right and left sides of the human heart are distinctly separated. This adaptation
- A.** increases the rate of blood circulation
  - B.** decreases the rate of blood circulation
  - C.** puts less strain on any one part of the heart
  - D.** prevents oxygenated and deoxygenated blood from mixing
- 24.** Which components are characteristic of blood type AB?
- A.** There are A and B antigens in the plasma and neither anti-A nor anti-B antibodies on the red blood cells.
  - B.** There are anti-A and anti-B antibodies in the plasma and neither A nor B antigens on the red blood cells.
  - C.** There are A and B antigens on the red blood cells and neither anti-A nor anti-B antibodies in the plasma.
  - D.** There are anti-A and anti-B antibodies in the plasma and both A and B antigens on the red blood cells.

25. Which statement is true of **all** veins?
- A. Veins carry oxygenated blood.
  - B. Veins carry blood to capillaries.
  - C. Veins carry blood toward the heart.
  - D. Veins carry blood away from the heart.

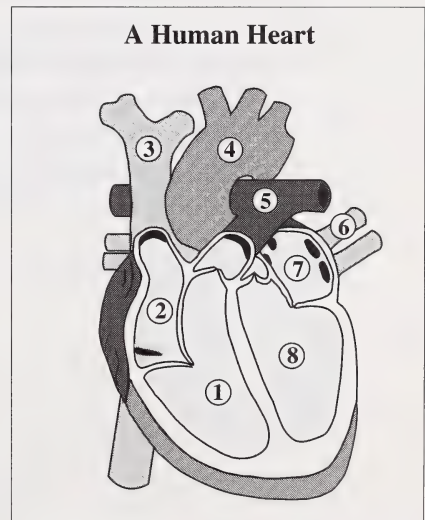
26. In the diagram at the right, the cellular element that transports carbon dioxide and oxygen is labelled

- A. 1
- B. 2
- C. 3
- D. 4



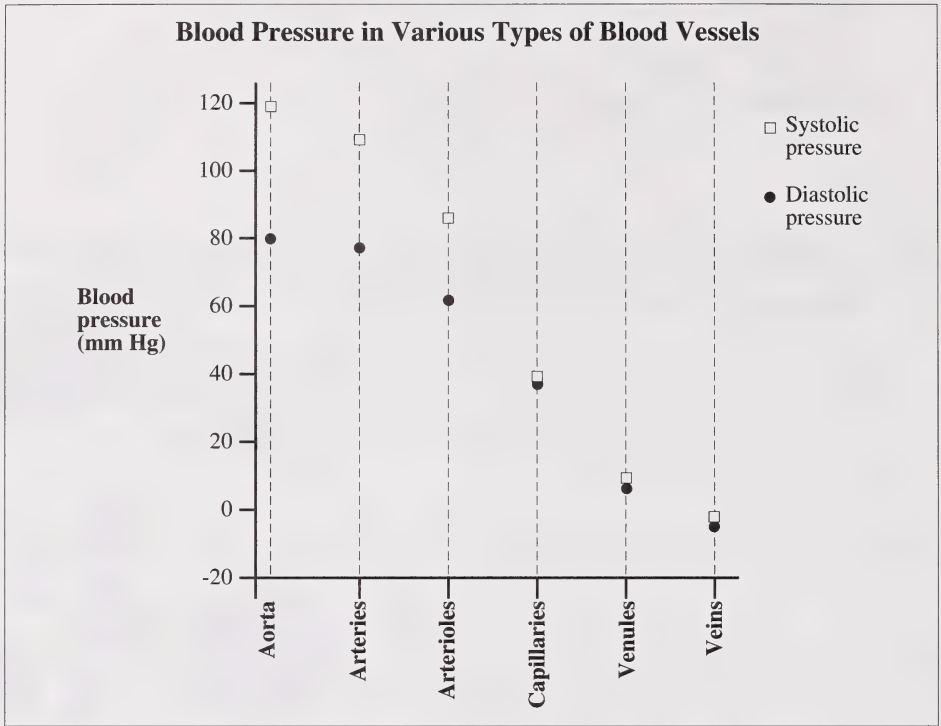
27. In the diagram at the right, locate a blood vessel that carries deoxygenated blood to the heart. Beginning with that blood vessel, choose the sequence of numbers that traces the flow of blood through the heart, to the lungs, and back to the heart.

- A. 3, 2, 1, 5, and 4
- B. 3, 2, 1, 5, and 6
- C. 6, 7, 8, 4, and 3
- D. 6, 7, 8, 4, and 5





Use the following graph to answer question 28.



28. Which statement is a logical inference based on this graph?
- A. The blood pressure causing the filtration of fluids out of the capillaries in the glomerulus remains nearly the same during systole and diastole.
  - B. The drop in blood pressure from arterioles to capillaries is caused by an increase in blood vessel diameter.
  - C. Vessels with the greatest difference between systolic and diastolic pressures are farthest from the heart.
  - D. Less blood is lost from a severed artery than from a severed vein of a similar size.

*Use the following information to answer questions 29 and 30.*

A young mountain climber from Calgary was chosen at the last minute to fill in for one of the junior members of a Mount Everest climbing expedition. She flew directly from Calgary to Nepal. Upon her arrival, she was escorted to a high-altitude supply camp where she was to help prepare for the ascent of the mountain. Shortly after beginning this work, which involved strenuous activity, the young mountain climber collapsed. After recovering, she started working at a much slower rate. For the rest of her month-long stay at the supply camp, the mountain climber gradually increased her workload until she was able to function normally at that elevation.

- 29.** Assuming that the young mountain climber was in excellent health when she left Calgary, which condition likely caused her collapse?
- A.** A high leukocyte count
  - B.** High levels of oxyhemoglobin
  - C.** An inadequate erythrocyte count
  - D.** Inadequate levels of carbaminohemoglobin
- 30.** Upon returning to Calgary, a major physiological difference the mountain climber will notice is a temporary decrease in her
- A.** parasympathetic nervous activity
  - B.** blood's ability to carry oxygen
  - C.** breathing rate
  - D.** energy level
- 
- 31.** Dust particles do not accumulate in the respiratory tract because they are
- A.** filtered and trapped by the epiglottis
  - B.** captured by mucus and expelled by the beating action of cilia
  - C.** ingested and broken down by leukocytes that move freely throughout the breathing system
  - D.** absorbed by blood vessels in the alveoli and transported to the excretory system for elimination

Use the following information to answer question 32.

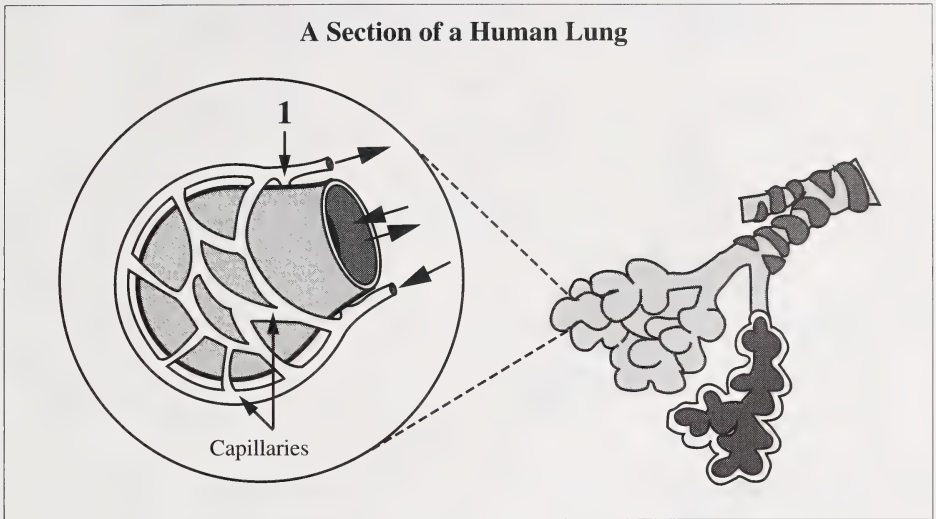
Some students were asked to design an experiment that could determine the effects of different activities on pulse rate. The subjects chosen for the experiment were three 18-year-old males, weighing between 90 kg and 100 kg, with normal blood pressure. After each activity, the subjects were allowed sufficient time for their pulse rate to return to the resting rate. The data obtained were recorded in the following table.

Activity	Time of Measurement	Pulse Rate Per Minute		
		Subject 1	Subject 2	Subject 3
Resting	end of rest period	70	60	72
Smoking	immediately after smoking	87	86	90
	10 minutes after smoking	80	81	83
Drinking coffee	immediately after drinking coffee	85	85	88
	10 minutes after drinking coffee	72	70	73

32. Which inference could be correctly derived from these data?
- A. Caffeine stimulates the sympathetic nervous system and is metabolized more slowly than nicotine.
  - B. Caffeine stimulates the sympathetic nervous system and is metabolized more quickly than nicotine.
  - C. Caffeine stimulates the parasympathetic nervous system and is metabolized more slowly than nicotine.
  - D. Caffeine stimulates the parasympathetic nervous system and is metabolized more quickly than nicotine.
- 
33. An iron deficiency affects the body's capacity to
- A. carry oxygen
  - B. produce vitamins
  - C. expel carbon dioxide
  - D. produce bicarbonate ions



Use the following diagram to answer question 34.



34. Blood flowing past location 1 is

- A. oxygenated and travelling in a pulmonary venule
- B. oxygenated and travelling in a pulmonary arteriole
- C. deoxygenated and travelling in a pulmonary venule
- D. deoxygenated and travelling in a pulmonary arteriole

Use the following information to answer question 35.

### Mechanically Aided Breathing

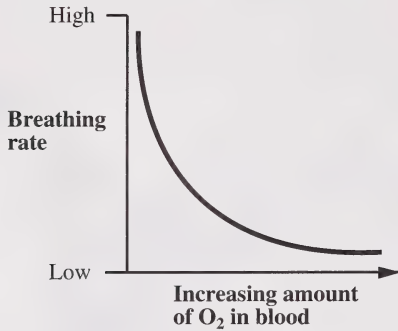
Before the development of a preventive vaccine, polio caused paralysis in many people. If paralysis extended to the upper body, a patient was placed inside an *iron lung*, which mechanically aided breathing. The *iron lung* was an airtight chamber with a rubber seal that fit around the patient's neck. Only the head of the patient was outside the machine.

35. The function of the iron lung was to

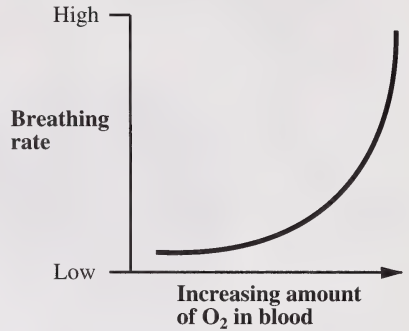
- A. filter, moisten, and warm inhaled air
- B. change air pressure around the chest cavity
- C. provide an artificial membrane for gas exchange
- D. stimulate the breathing centre in the medulla oblongata

36. Which graph indicates the correct relationship between the amount and type of gas in blood and the stimulation of the breathing-rate centre in the medulla?

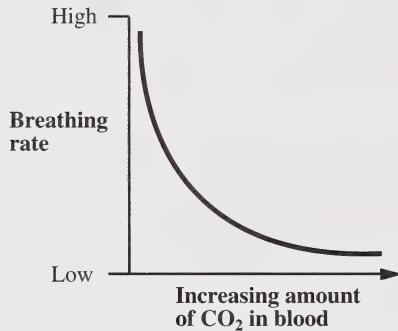
A.



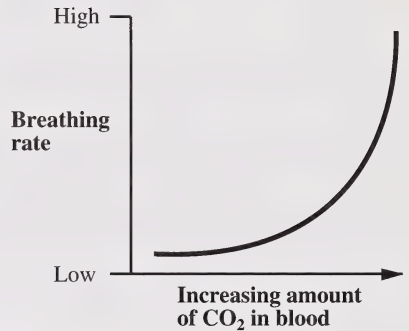
B.



C.



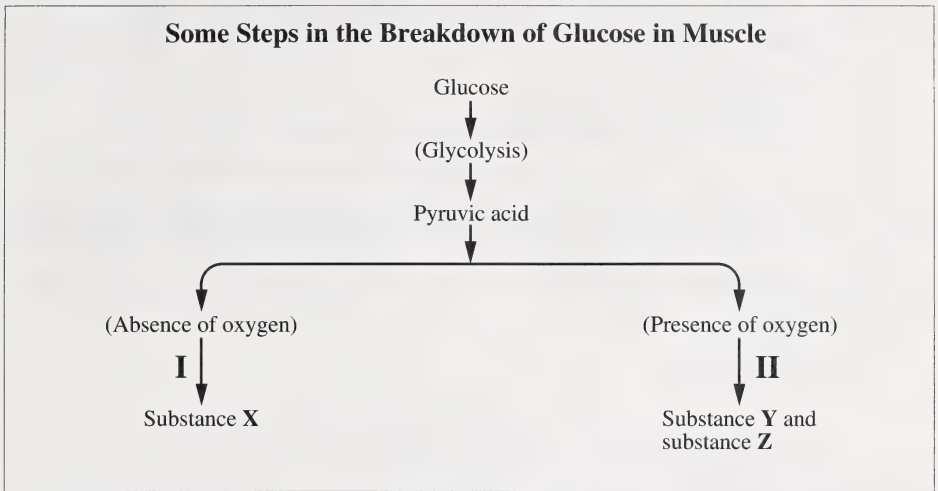
D.



37. In addition to glucose, energy sources that cells may use include both

- A. minerals and vitamins
- B. vitamins and proteins
- C. fats and minerals
- D. proteins and fats

Use the following information to answer questions 38 and 39.



38. Substances X, Y, and Z **respectively** are
- A. lactic acid,  $\text{CO}_2$ , and  $\text{H}_2\text{O}$
  - B.  $\text{H}_2\text{O}$ , lactic acid, and ATP
  - C.  $\text{H}_2\text{O}$ , lactic acid, and  $\text{CO}_2$
  - D.  $\text{CO}_2$ , ATP, and lactic acid
39. The number of chemical reactions in pathway I is
- A. fewer than in pathway II, and pathway II releases more energy
  - B. the same as in pathway II, but pathway II releases less energy
  - C. the same as in pathway II, but pathway II releases more energy
  - D. greater than in pathway II, and pathway II releases more energy
- 
40. In humans, renal veins carry blood from the kidneys to the
- A. superior vena cava
  - B. inferior vena cava
  - C. pulmonary vein
  - D. aorta

41. Blood leaving the liver has a high concentration of urea, which is formed by the
- digestion of protein
  - denaturation of protein
  - deamination of amino acids
  - detoxification of fatty acids
42. The movement of fluid from blood in the glomerulus to Bowman's capsule is called
- filtration
  - diffusion
  - reabsorption
  - active transport

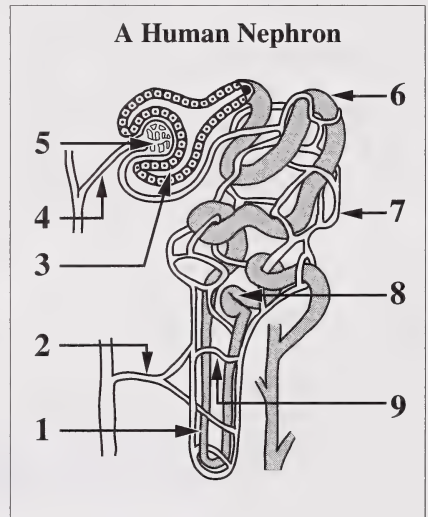
*Use the diagram on the right to answer questions 43 to 45.*

43. Water is reabsorbed from the three structures labelled

- 1, 3, and 9
- 1, 6, and 8
- 3, 5, and 8
- 5, 6, and 9

44. The concentration of urea is greatest in the blood vessel labelled

- 2
- 4
- 7
- 9



45. An increase in blood levels of both aldosterone and ADH would most directly affect the structure labelled

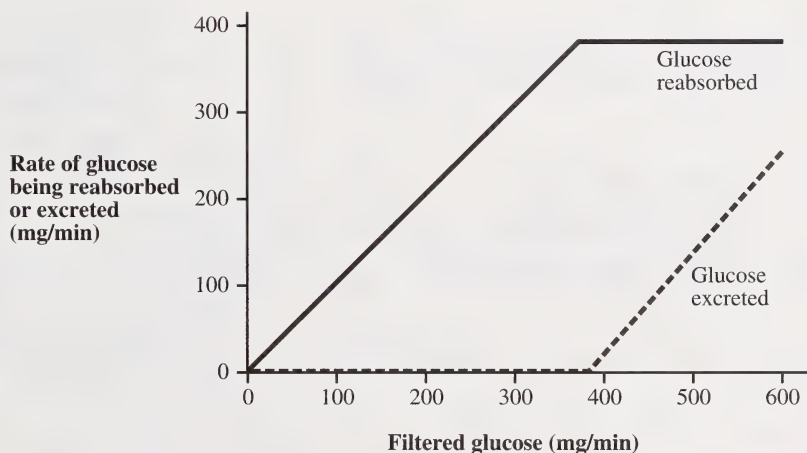
- 1
- 5
- 6
- 8



46. A dialysis machine has a membrane that is permeable to water, urea, uric acid, ammonia, salts, and glucose. The membrane is impermeable to protein molecules. In relation to the blood flowing through the dialysis machine, the dialyzing solution must have
- A. the same concentrations of urea and salts
  - B. lower concentrations of glucose and protein
  - C. lower concentrations of urea, uric acid, and ammonia, and higher or equal concentrations of glucose
  - D. higher concentrations of urea, uric acid, and ammonia, and lower or equal concentrations of glucose

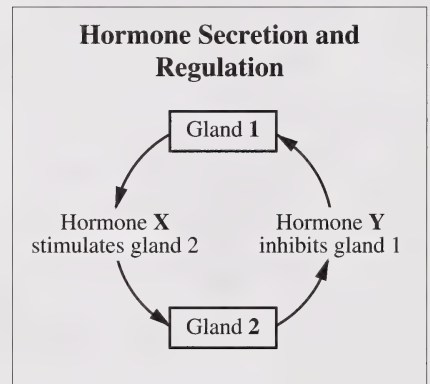
*Use the following information to answer question 47.*

A doctor conducted a test to study glucose transport in the human kidney. His subject was a person whose kidneys functioned normally. He gave the subject glucose intravenously so as to increase the person's plasma glucose and filtered glucose levels. The doctor collected data comparing the amount of glucose reabsorbed by the kidney with the amount excreted by the kidney and then summarized the test results in the following graph.



47. Which statement is a correct conclusion based on these test results?
- A. The tubules of the kidney reabsorb all available glucose.
  - B. The tubules of the kidney have a maximum potential for reabsorbing glucose.
  - C. The permeability of the collecting ducts to glucose decreases, slowing reabsorption.
  - D. The extra glucose triggers a decrease in cellular respiration; therefore, glucose is excreted.

48. In children, cretinism is characterized by stunted growth, mental retardation, low body temperature, and sluggishness. These symptoms can be avoided if the condition is treated early with
- A. insulin
  - B. thyroxine
  - C. adrenaline
  - D. testosterone
49. Which statement about hormones is accurate?
- A. Hormones cause an instantaneous stimulating effect.
  - B. Hormones stimulate only one target organ or group of cells.
  - C. Hormones are transported from endocrine glands by the circulatory system.
  - D. Hormones are produced by the central nervous system and stored in exocrine glands.
50. In the diagram at the right, glands 1 and 2 **respectively** could represent which pair of structures?
- A. Pancreas and liver
  - B. Testis and pituitary
  - C. Pituitary and thyroid
  - D. Adrenal gland and pancreas



- 51.** The auditory nerve conducts impulses to the cerebrum from the
- A.** cochlea
  - B.** ear drum
  - C.** eustachian tube
  - D.** semicircular canals
- 52.** Which division of the nervous system prepares the body for vigorous physical activity?
- A.** Central nervous system
  - B.** Peripheral nervous system
  - C.** Sympathetic nervous system
  - D.** Parasympathetic nervous system
- 53.** A neuron will transmit an impulse when the strength of a stimulus is great enough to reach the
- A.** polarization level
  - B.** threshold level
  - C.** synapse
  - D.** axon
- 54.** Transmission of a nerve impulse depends primarily on the stimulus
- A.** increasing the neuron's permeability to sodium ions and thus allowing these ions to enter the neuron
  - B.** decreasing the neuron's permeability to sodium ions and thus allowing these ions to leave the neuron
  - C.** increasing the neuron's permeability to potassium ions and thus allowing these ions to enter the neuron
  - D.** decreasing the neuron's permeability to potassium ions and thus allowing these ions to leave the neuron

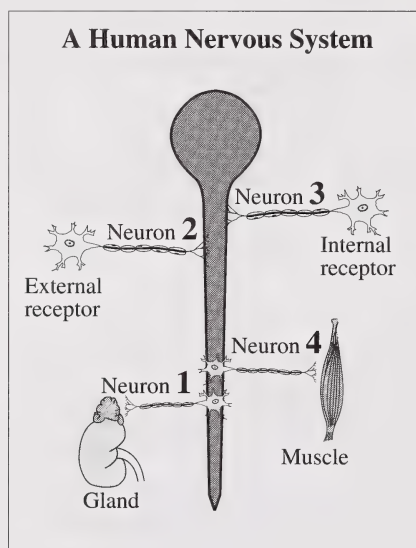
Use the following information to answer question 55.

Ataxia is a condition characterized by an inability to co-ordinate the speed, force, and direction of muscle movement. The movements of a person suffering from ataxia may resemble those of a drunken person. The person may reach for an object and miss it, by placing the hand too far to the left or right, and then attempt to compensate by moving the hand in the wrong direction.

55. A person suffering from ataxia would probably have damage to the
- A. cerebellum
  - B. hypothalamus
  - C. medulla oblongata
  - D. parasympathetic nerves

56. Information about arterial blood pressure may be carried to the central nervous system by the neuron in the diagram at the right labelled

- A. 1
- B. 2
- C. 3
- D. 4

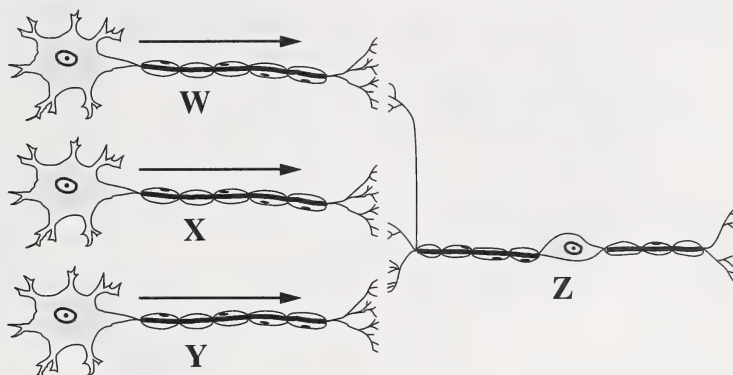


57. A blink reflex may be tested by shooting a puff of air at the eye and measuring the length of time between the air striking the eye and the blink of the eyelid. During this observed reaction time, an impulse is moving along the
- A. motor neuron, to the association neuron (interneuron), to the sensory neuron
  - B. association neuron (interneuron), to the sensory neuron, to the motor neuron
  - C. sensory neuron, to the association neuron (interneuron), to the motor neuron
  - D. sensory neuron, to the motor neuron, to the association neuron (interneuron)



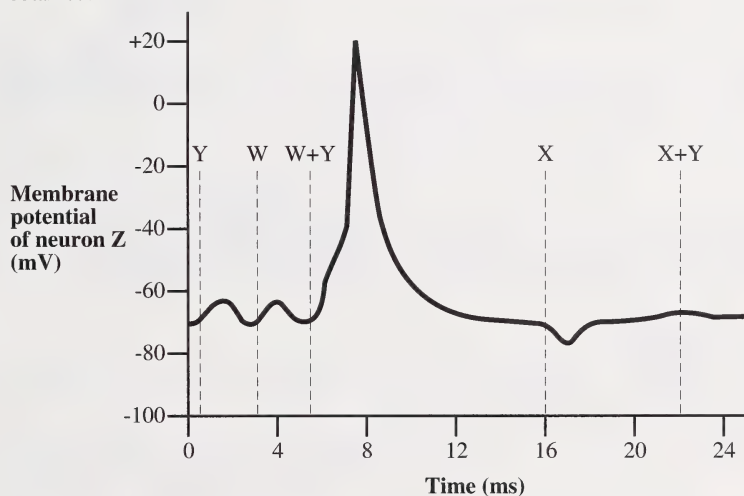
Use the following information to answer question 58.

An experiment was conducted to examine the relationship of neurons W, X, and Y to neuron Z.



Note: Arrows indicate the direction of impulses.

A microelectrode recorded the membrane potential of neuron Z. The graph illustrates the results obtained.



Note: Dotted lines indicate the times when neurons W, X, and Y were stimulated.

58. Which row correctly identifies the excitatory and inhibitory neurons?

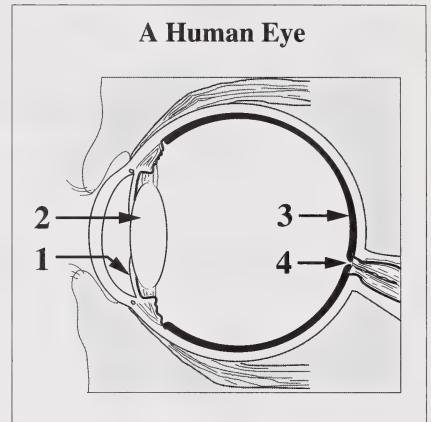
Row	Excitatory Neuron(s)	Inhibitory Neuron(s)
A	W	X and Y
B	X	W and Y
C	W and Y	X
D	X and Y	W

59. Multiple sclerosis is a disease in which the myelin sheaths of neurons degenerate. A person with this disease would have

- A. an increased rate of diffusion of acetylcholine in synapses
- B. a decreased rate of diffusion of acetylcholine in synapses
- C. an increased speed of nerve impulse transmission
- D. a decreased speed of nerve impulse transmission

60. Focusing to adjust for changes in object distance is primarily accomplished by the structure in the diagram at the right labelled

- A. 1
- B. 2
- C. 3
- D. 4



61. The ion required as a co-factor to activate cross-bridges between actin and myosin during muscle fibril contraction is

- A. potassium
- B. chloride
- C. calcium
- D. sodium

62. Ligaments and tendons are composed of strong connective tissue. The blood supply to ligaments and tendons is poor, unlike the blood supply to bone and muscle. Partly because of this limited blood supply, ligaments and tendons

- A. are readily injured
- B. heal slowly after injury
- C. can function without ATP
- D. swell significantly when injured

63. The correct order of structures listed at the right through which a sperm cell passes as it exits a male's body is

- A. 2, 3, 4, and 1
- B. 3, 2, 1, and 4
- C. 3, 4, 2, and 1
- D. 4, 3, 1, and 2

**Some Structures of the Male Reproductive System**

- 1. Urethra
- 2. Vas deferens
- 3. Seminiferous tubules
- 4. Epididymis

64. Sterility in males could be a result of

- A. blockage of both ureters
- B. nonfunctional seminiferous tubules
- C. the presence of fructose (sugar) in the semen
- D. a scrotal temperature of slightly less than 37°C

65. A young male develops chest hair and his voice changes because of an increase in secretion of

- A. FSH followed by testosterone
- B. FSH followed by growth hormone
- C. LH (ICSH) followed by testosterone
- D. LH (ICSH) followed by growth hormone

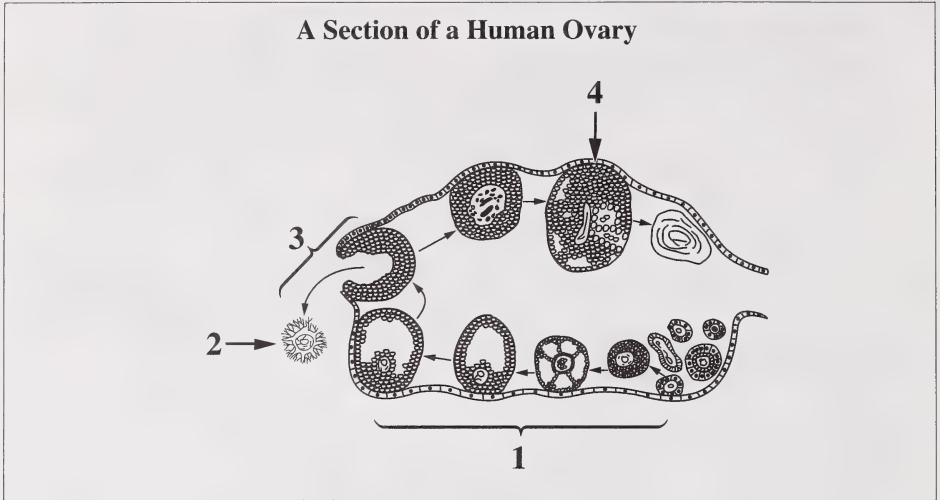
66. Which reproductive structures are **least** similar in function?

- A. Interstitial cells of testes and follicles of ovaries
- B. Seminiferous tubules and uterus
- C. Vas deferens and Fallopian tube
- D. Testes and ovaries

67. When normal labor contractions are insufficient to cause birth, which hormone can be given to a woman to increase her uterine contractions?

- A. Relaxin
- B. Oxytocin
- C. Progesterone
- D. Follicle stimulating hormone

Use the following diagram to answer questions 68 and 69.



68. Which statement is **correct**?
- A. The process labelled 1 causes secretion of FSH.
  - B. The structure labelled 2 secretes progesterone.
  - C. The process labelled 3 occurs in response to increasing levels of progesterone.
  - D. The structure labelled 4 secretes increased amounts of progesterone under the influence of LH.
69. During an ovarian cycle, the structure labelled 4 will continue to develop if
- A. ovulation occurs
  - B. pregnancy occurs
  - C. fertilization does not occur
  - D. menstruation follows ovulation
- 
70. An ectopic pregnancy is one in which an embryo implants in a place other than the uterus—most commonly in a Fallopian tube. This embryo does not mature because the lack of
- A. human chorionic gonadotropin secreted by the ovaries causes a miscarriage
  - B. estrogen secreted by the placenta causes a miscarriage
  - C. protection causes the embryo to die
  - D. nutrients causes the embryo to die

***You have now completed Part A. Proceed directly to Part B.***



# ***Part B: Written Response***

## ***4 Questions***

### ***Instructions***

- Read each question carefully.
- Write your answers in the examination booklet as neatly as possible.
- Communicate your answers in clear, complete sentences unless the response format dictates otherwise. Marks will be awarded for pertinent explanations and answers. Question 1 has two marks allotted for your written communication.

***Note:*** The perforated pages at the back of this booklet may be torn out and used for your rough work. ***No marks*** will be given for work done on the tear-out pages.

***Start Part B immediately.***

*Use the following information to answer question 1.*

### **The Three Rs**

Out of concern for the environment, people are taught to practice the “three Rs”—reduce, re-use, and recycle. This concept can also apply to the human body, which may be thought of as an ecological unit.

Both the environment and the body benefit from the “three Rs”.



**Reduce:** Environmentally, it is a good idea to turn down the thermostat in your home at night to reduce energy consumption.

**The body also has mechanisms to reduce consumption of energy and substances.**

**Re-use:** It is environmentally sound to use some things, such as cloth diapers, many times.

**The body uses substances repeatedly without changing their form.**

**Recycle:** To decrease the accumulation of waste in the environment, used paper may be shredded and formed into new materials. **In the body, some substances are broken down and formed into new materials.**

**10 marks**

1. Give a general reason **why** the human body makes use of the “three Rs”. Describe specific examples of **how** the human body uses **two** of the “three Rs” with respect to energy or substances. (5 marks)

Provide **three** examples of technology (procedures, equipment) and explain how each example would be used to assist the body in reducing, re-using, or recycling energy or substances. (3 marks)

Present your response in paragraphs that are clearly written and logically organized. (2 marks)

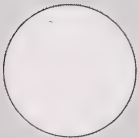
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**5 marks**

2. To maintain homeostasis, one body system may assist another in performing a major metabolic function.

a. How does the circulatory system assist the excretory system?

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b. How does the excretory system assist the circulatory system?

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c. How does the nervous system assist the breathing system?

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d. How does the breathing system assist the nervous system?

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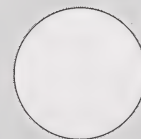
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e. How does the digestive system assist all other body systems in performing their metabolic functions?

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*Use the following information to answer question 3.*

The work of the American physician William Beaumont is a landmark in the history of research on gastric activity. In 1822, he was called upon to treat a trapper, Alexis St. Martin, who had suffered a serious gunshot wound. The wound had penetrated both the muscular wall of St. Martin's abdominal cavity and the wall of his stomach. Under Beaumont's care, St. Martin made an excellent recovery; however, the edges of the wound in the body wall and the stomach fused together and formed a permanent opening into his stomach.

For the next eight years, Beaumont carried out a series of investigations into the activity in St. Martin's stomach. Beaumont would attach a food sample to a cellulose string, pass it through the opening into St. Martin's stomach, and leave it there for a period of time. After one or two hours, he would pull out the string, with or without the attached food sample.

**5 marks**

- 3.** What effect, if any, would stomach activity (physical and/or chemical) have on each of the following samples? Justify your answer in each case.

- a.** A chunk of beef fat

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- b.** A chunk of lean raw beef

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- c.** A chunk of white bread

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- d.** A sugar cube

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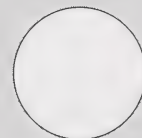
- e.** The cellulose string

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*(Question 4 is on page 34.)*

**Total: 10 marks**

*Use the following information to answer question 4.*

### Neonatal Deaths of Squirrel Monkeys

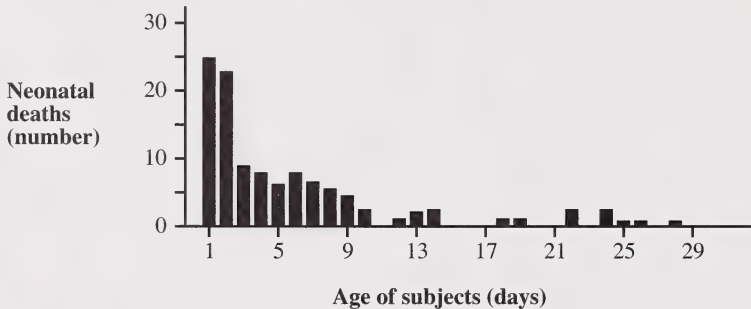
A large incidence of neonatal (newborn) illness and death in a breeding colony of squirrel monkeys led concerned researchers to conduct a study to determine some possible causes.

In one series of tests, researchers determined the level of glucose in the plasma of a group of monkeys from birth until they became ill, died, or reached the age of 29 days. Researchers took blood samples daily and tested them daily.

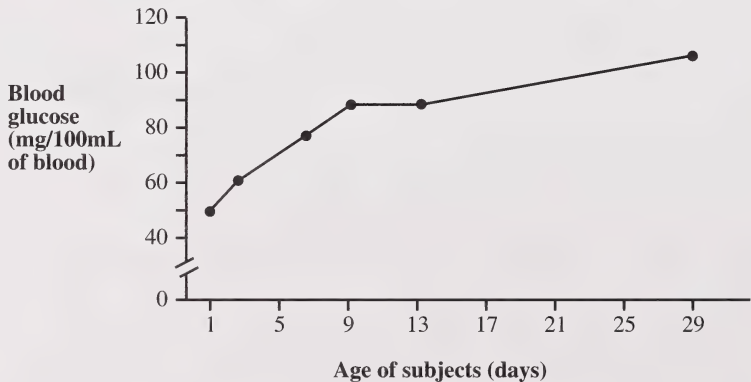
In another test, performed on a group of monkeys of varying ages, researchers determined the percentage of glycosylated hemoglobin (hemoglobin molecules bonded to glucose) present in the red blood cells of the monkeys. The percentage of glycosylated hemoglobin reflects the blood-glucose history of an animal. A high percentage indicates that the blood-glucose levels in the animal were high for a period of up to 120 days before the test. A low percentage of glycosylated hemoglobin indicates a history of low blood-glucose levels.

Some of the data collected are summarized in graphs 1, 2, and 3.

**Graph 1: Number of Neonatal Deaths in a Squirrel Monkey Colony**



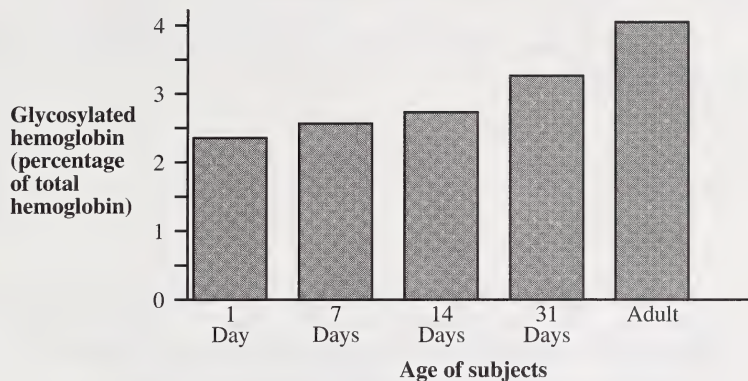
**Graph 2: Average Blood-Glucose Levels in Young Squirrel Monkeys**



*Continued*



**Graph 3: Average Percentage of Glycosylated Hemoglobin in Squirrel Monkeys of Varying Ages**



Note: The average glycosylated-hemoglobin content in an adult squirrel monkey is 4.0%.

4. a. According to the data on page 34, what is the apparent relationship between the number of neonatal deaths and average blood-glucose levels? (1 mark)

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- b. Suggest two effects resulting from a low level of glucose in the blood that may have led to the observed neonatal illness and death among the monkeys. (2 marks)

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**(2 marks)**

- c. The researchers felt that isolating baby monkeys from their mother's care and then restraining the babies to take blood samples probably produced some misleading results in the blood-glucose tests.

- i. Suggest one reason why the blood-glucose test results may have been misleading.

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- ii. Suggest one reason why researchers found the glycosylated-hemoglobin test preferable to the blood-glucose test.

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**(2 marks)**

- d. Identify two factors, other than the one described in part c, that the researchers likely regulated during this study in an attempt to ensure accurate blood-glucose test results.

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*Continued*

- e. The percentage of glycosylated hemoglobin in squirrel monkey blood can be used to predict the probability of neonatal deaths, but low levels of glycosylated hemoglobin are likely not a direct cause of neonatal death. Explain why.

**(1 mark)**

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- f. Two types of blood tests were used during this study of neonatal monkey deaths. Identify two diseases of glands in human adults that might be diagnosed using data from these types of blood tests.

**(2 marks)**

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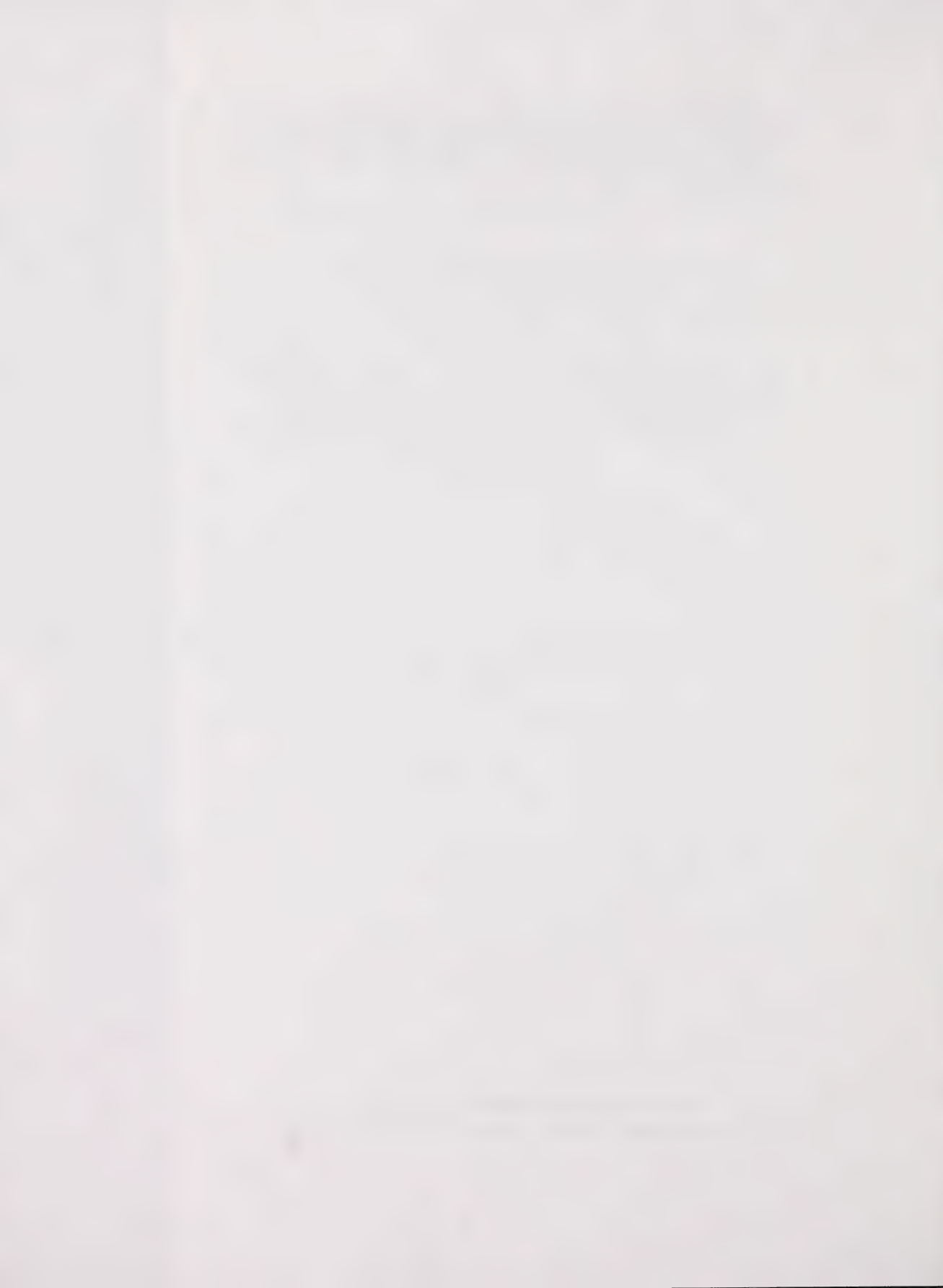
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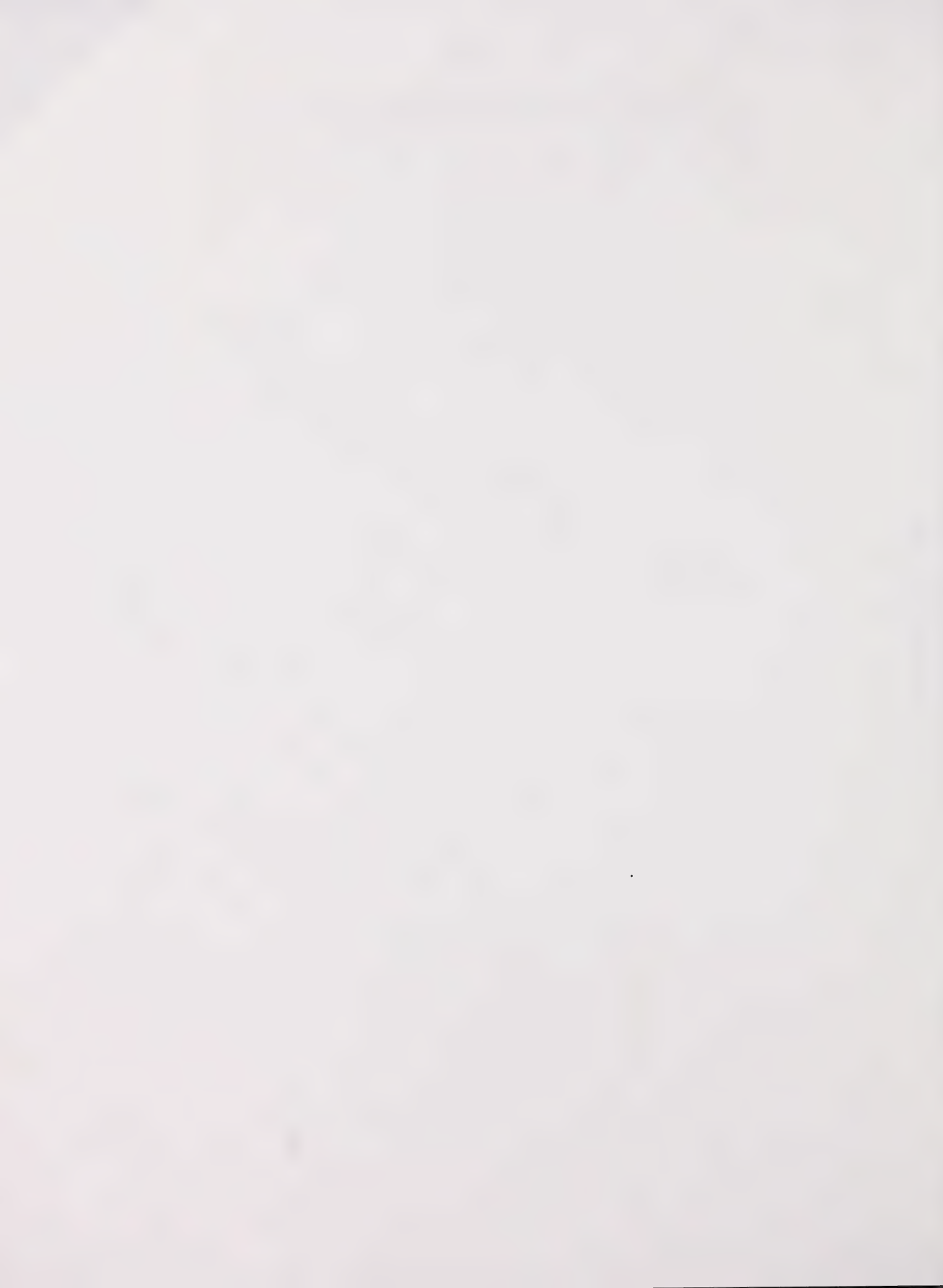
*You have now completed the examination.  
If you have time, you may wish to check your answers.*



*No marks will be given for work done on this page.*

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*No marks will be given for work done on this page.*

*Fold and tear along perforation.*



***No marks will be given for work done on this page.***

*Fold and tear along perforation.*









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